

### REMARKS

Claims 1-48 and 53-79 were pending when the present Office Action was mailed January 5, 2007. In this response, claims 30 and 45 have been amended to correct minor clerical issues unrelated to patentability. Accordingly, claims 1-48 and 53-79 are currently pending.

In the January 5, 2007, Office Action, claims 1-20, 25 and 57-62 were rejected, and the rest of the claims were allowed or indicated as being allowable if rewritten in independent form. More specifically, the status of the application in light of this Office Action is as follows:

(A) Claims 57-62 and 79 were subject to an objection as being drawn to compounds in the context of a product-by-process claim format;

(B) Claims 57-62 and 79 were rejected under 35 U.S.C. § 102(b) over European Patent No. 246,366 to White et al. ("White");

(C) Claims 1-20, 25, 57 and 58 were rejected under 35 U.S.C. § 103(a) over the combination of U.S. Patent No. 4,696,911 to Boerma ("Boerma"), Maskaev et al., *Selection of Catalyst for Commercial Production of 12-Hydroxystearic Acid – a Saponifiable Base for Greases*, (1973) ("Maskaev"), and White;

(D) Claims 21-24, 26 and 27 were indicated as being allowable; and

(E) Claims 28-48, 53-56 and 63-78 were allowed.

#### A. Response to Product-by-Process Claim Objections

Claims 57-62 and 79 were objected to as being drawn to compounds in the context of a product-by-process claim format. The Examiner, more specifically, asserts that "[p]roduct-by-process claim language is reserved for situations where the compound cannot be claimed in a definite manner." (Office Action, pg 2.) The Applicants respectfully disagree because the patentability of a product-by-process claim is based on the product whether or not the product is structurally defined or the product is defined by its

characteristics. (See, e.g., MPEP § 2113.) Claims 57-62 and 79 are directed to a product (e.g. an edible hydrogenated fat) having a chemical composition resulting from the claimed hydrogenation process. Accordingly, the objection of claims 57-62 and 79 should be withdrawn.

**B. Response to Section 102(b) Rejection**

Claims 57-62 and 79 were rejected under 35 U.S.C. § 102(b) over White. This reference, however, cannot support a Section 102 rejection of claims 57-62 and 79 for at least the reason that it fails to teach or suggest each and every element of these claims.

Independent claim 57 is directed to an edible hydrogenated fat composition that is formed by hydrogenating an unsaturated feedstock. The unsaturated feedstock is hydrogenated by, at least in part, producing a catalyst composition by heating a nickel-based catalyst to a first temperature of at least about 100°C in the presence of a process gas and a fat component. The process of hydrogenating the unsaturated feedstock includes contacting the unsaturated feedstock having at least one unsaturated organic component with the catalyst composition and hydrogenating the unsaturated feedstock by sustaining a hydrogenation reaction at a second temperature of no greater than about 70°C.

White discloses a process of hydrogenating liquid oils with a partially deactivated nickel catalyst at a hydrogenation temperature starting between 160°C and 200°C and gradually increasing to a final temperature of 210°C to about 250°C. The preferential temperature range taught by White is about 180°C to about 240°C. (White; pg. 3, ln. 21-26; pg. 5, ln. 23-25.) White attempts to provide a hydrogenation process whereby a hydrogenation oil is produced that has a narrow melting range but is relatively stable (more solid than liquid) at room temperature (21°C - 33°C). (White; pg. 3, ln. 15, 29-30, 36-37.) White relies on using a partially deactivated nickel catalyst, preferably a sulfur-poisoned deactivated nickel catalyst, to "control the rate of the reaction, and thereby the relative proportions of *cis*- and *trans*-fatty acid triglycerides in the products formed." (White; pg. 4,

ln. 40-43.) As such, the fats produced according to White may contain small amounts of undesirable sulfur contamination.

Claim 57 is novel over White because White fails to disclose or suggest several claimed features. For example, the edible hydrogenated fat composition of claim 57 is significantly different from the hydrogenated product produced from the process of White because White uses a higher temperature during hydrogenation that produces a higher *trans*-fatty content than the compositions of claim 57. More specifically, White discloses that "as the temperature of reaction is increased, the formation of *trans*-unsaturation increases almost linearly." (White; pg. 3, ln. 54-55.) White teaches using a hydrogenation temperature consistent with the higher temperatures of the prior art such that the combined effect of using higher temperatures during the hydrogenation process and a partially deactivated nickel catalyst results in hydrogenated fat products that are more solid than liquid at room temperature and have a *trans*-fatty acid content ranging from 41% to 64% of the modified fatty acid composition. (White; pg 7-9, examples 1-3.) The compositions formed at lower hydrogenation temperatures in accordance with claim 57 have lower *trans*-fatty acid contents. Additionally, several embodiments of products produced in accordance with the method of claim 57 do not contain undesirable amounts of sulfur. The composition characteristics of White's hydrogenated fat products are sufficiently different than those of the claimed composition such that claim 57 is novel over White.

Claim 57 is also patentable over White under Section 103 because White teaches away from further reduction in *trans*-fatty acid content as well as from having a hydrogenated fat product that is no more solid than semi-liquid at room temperature (i.e. 25°C). White discloses that the relative proportion of *cis*- and *trans*-fatty acid triglycerides is critical to the desired melting properties of the composition. White also teaches that relatively equal levels of *trans*- and *cis*-fatty acids yield a mixture of solids (*trans*-fatty acids) and liquids (*cis*-fatty acids) that have desirable stability at room temperature as well as desirable melting properties at higher body temperatures. (White; pg. 4, ln. 11-12, 40-42.) By specifically teaching the advantages of using a partially deactivated nickel catalyst

and higher hydrogenation temperatures, White teaches away from features of claim 57. Accordingly, claim 57 is also patentable over White under Section 103.

Claim 58 depends from the allowable independent claim 57, and thus claim 58 is patentable over White for the reasons discussed above and for the additional features of this claim. The applicants, therefore, respectfully request withdrawal of the rejections of claims 57 and 58 over White.

Independent claim 59 is directed to an edible hydrogenated fat composition that is formed by hydrogenating an unsaturated oil having an initial Iodine Value and an initial fatty acid content including at least about 4 weight percent C18:3. The hydrogenation method includes dispersing a nickel-based catalyst in the oil and delivering hydrogen to the oil. The method further includes hydrogenating the oil at a hydrogenation temperature no greater than about 70°C for a time in order to yield a hydrogenated oil having a modified Iodine Value. Additionally, the method will yield a hydrogenated oil having a modified fatty acid content from the initial fatty acid content such that the hydrogenated oil is no more solid than semi-liquid at 25°C. The method also includes an average Iodine Value change rate of no less than about 5/hour (defined by the absolute difference between the initial Iodine Value and the modified Iodine Value divided by the hydrogenation time). The edible hydrogenated fat of Claim 59 has no more than about 2.5% of the modified fatty acid content comprising C18:3, and no more than about 6% of the modified fatty acid content comprising *trans*-fatty acids.

Claim 59 is patentable over White because this reference fails to disclose or suggest several claimed features. For example, the edible hydrogenated fat composition of claim 59 differs from the hydrogenated product produced from the process taught by White because this reference fails to teach or suggest an edible hydrogenated oil that is no more solid than liquid at 25°C and has no more than about 6% of the modified fatty acid content comprising *trans*-fatty acids. In contrast, White teaches that relatively equal levels of *trans*- and *cis*-fatty acids yield a product that is a mixture of solids (*trans*-fatty acids) and liquids (*cis*-fatty acids) and has the desirable stability at room temperature as well as the

desirable melting behavior at higher body temperatures. (White; pg. 4, ln. 11-12, 40-42.) Accordingly, the Section 102 rejection of claim 59 should be withdrawn.

Claim 60 depends from the allowable independent claim 59, and thus the Section 102 rejection of this claim should be withdrawn for the reasons discussed above and for the additional features of this claim.

Independent claims 61, 62 and 79 include several features generally similar to claims 57 and 59 (e.g. an edible hydrogenation fat composition or a margarine comprising an edible hydrogenation fat composition). Accordingly, for reasons similar to those discussed above with respect to claims 57 and 59, and for the additional features of claims 61, 62 and 79, the Section 102 rejection of claims 61, 62 and 79 over White should be withdrawn.

C. Response to Section 103(a) Rejection

Claims 1-20, 25, 57 and 58 were rejected under 35 U.S.C. § 103(a) over the combination of Boerma, Maskaeve and White. The Examiner correctly states that Boerma differs from the claims by reciting an upper temperature of 80°C for the preparation of the catalyst and finds the applicants' previous arguments regarding rejection of claims 1, 2, 4-20 and 25 under 35 U.S.C. § 102(b) persuasive because Boerma fails to disclose several of the claimed features. In the current Office Action, however, the Examiner asserts that "it would have been obvious to one of ordinary skill in the art to modify the process taught by Boerma by increasing the temperature range in preparing the catalyst" in view of Maskaeve. The applicants respectfully disagree and stress that Maskaeve fails to cure the deficiencies of Boerma because the prior art does not suggest the desirability of modifying the method of Boerma to increase the temperature during the catalyst preparation reaction. This is particularly applicable in the present case because, as discussed below, modifying Boerma according to the teachings of Maskaeve would render the resulting catalyst product unsatisfactory and/or useless for Boerma's purpose.

1. Independent Claim 1 is Directed to a Method of Hydrogenating an Unsaturated Feedstock

Independent claim 1 is directed to a method of hydrogenating an unsaturated feedstock. The method includes producing a catalyst composition by heating a nickel-based catalyst to a first temperature of at least about 100°C in the presence of a process gas and a fat component. The method further includes contacting the unsaturated feedstock with the catalyst composition and hydrogenating the unsaturated feedstock by sustaining a hydrogenation reaction at a second temperature of no greater than about 70°C. Furthermore, the feedstock comprises at least one unsaturated organic component.

2. The Cited References

Boerma discloses a finely dispersed nickel boride catalyst which has been stabilized with a linear organic polymer that can be used to hydrogenate unsaturated organic feedstock. (Boerma; col. 1, ln. 40-41, 55-56.) The catalyst is made in a volatile polar solvent, such as ethanol, by reacting nickel salt with alkali borohydride in a solution containing a dissolved linear organic polymer containing pyrrolidone groups and also containing a partial fatty acid polyl ester group to stabilize the catalyst. (Boerma; col. 2, ln. 13-21, 55-56.) The reaction occurs "in a hydrogen or inert gas atmosphere at a temperature of between 0°C and 80°C, preferably between 20°C and 60°C." (Boerma; col. 2, ln. 21-23; emphasis added.) Upon completion of the reaction, oil is added to the catalyst solution and the solvent is subsequently removed by vacuum evaporation at a temperature between 15°C and 60°C. (Boerma; col. 2, ln. 32-35.)

Maskaev discloses preparation of reduced nickel catalysts from nickel carbonate and nickel formate salts in castor oil at 230°C - 250°C in a stream of hydrogen. The resulting catalysts were used for castor oil hydrogenation experiments at 130°C. (Maskaev; pg. 436, ¶ 6.) The Maskaev hydrogenation experiments were designed to select a catalyst for commercial production of 12-hydroxystearic acid for use in the production of high-quality greases. (Maskaev; pg. 435, title, ¶ 1-2.) Maskaev focuses on the selectivity of the catalysts to produce saturated castor oil without accompanying side reactions that result in reduction of the 12-hydroxystearic acid, a process influenced "by

such factors as temperature, pressure, and hydrodynamic conditions of the contacting, but are also highly dependent on the nature and quantity of the catalyst." (Maskaev; pg.435-436, ¶ 2.)

3. The Combination of Boerma and Maskaev Cannot Support a Section 103 Rejection of Claim 1 Because Modifying Boerma According to the Teachings of Maskaev Would Result In a Product That Would be Unsatisfactory for Boerma's Intended Purpose

Claim 1 is patentable over the combination of Boerma and Maskaev because increasing the temperature used to produce Boerma's catalyst to the temperature range taught by Maskaev would render the resulting product unsatisfactory or useless for the purpose taught by Boerma. For example, Boerma teaches that the nickel boride catalyst composition is formed in a volatile polar solvent and stabilized with a linear polymer containing pyrrolidone groups and a partial fatty acid polyol ester group. Boerma, more specifically, discloses preparation of a catalyst through a reaction of alkali borohydride and nickel salt in a volatile polar solvent at a temperature between 0°C and 80°C, and preferably between 20°C and 60°C. Boerma teaches that the alkali borohydride, the nickel salt, the linear organic polymer, and the partial fatty acid polyol ester are dissolved in the solvent and that the reaction takes place while the solvent is in a liquid phase. (Boerma; col. 2, ln. 13-27.) Only after the addition of the oil is the solvent removed by vacuum evaporation at a temperature between 15°C and 60°C. It appears that 80°C is the upper limit of Boerma's reaction temperature range for forming the catalyst and it seems that if the reaction temperature is increased to at least 100°C, then the volatile polar solvent would evaporate very quickly and negatively compromise the catalyst reaction. For example, it is well documented that alkali borohydride ( $\text{NaBH}_4$ ) is used to reduce metal catalysts, and specifically nickel, in an ethanol solution to produce "a nearly colloidal black suspension, in contrast to the granular precipitate resulting from reaction in aqueous solution."<sup>1</sup> Boerma specifically teaches conducting the sodium borohydride and nickel salt

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<sup>1</sup> Brown, C.A. and Ahuja, V.K. (1973), *Catalytic Hydrogenation. VI. The Reaction of Sodium Borohydride with Nickel Salts in Ethanol Solution. P-2 Nickel, A Highly Convenient, New, Selective Hydrogenation Catalyst with Great Sensitivity to Substrate Structure*, J. Org. Chem. 38, 2226.

reaction in ethanol (polar organic solvent) "leading to the formation of finely dispersed nickel boride." (Boerma; col.2, ln. 23-25.) Because known volatile polar organic solvents evaporate at lower temperatures (e.g. the boiling point of ethanol is 78.4°C), one of ordinary skill in the art would not increase the reaction temperature to at least 100°C. Therefore, one of ordinary skill in the art would not conduct the catalyst reaction of Boerma for the purpose of making an active nickel catalyst at temperatures of at least 100°C. The rejection of claim 1 over the combination of Boerma and Maskaevev should accordingly be withdrawn.

Claim 1 is also patentable over the combination of Boerma and White because there is no motivation or suggestion to combine these references nor do these references teach or suggest all the claim limitations. (MPEP § 2142.) As discussed above, White discloses a process of hydrogenating liquid oils with a partially deactivated nickel catalyst and attempts to provide a hydrogenation process whereby a hydrogenation oil is produced that has a narrow melting range but is relatively stable (more solid than liquid) at room temperature (21°C - 33°C). (White; pg. 3, ln. 15, 29-30, 36-37.) White teaches using a hydrogenation temperature consistent with the higher temperatures of the prior art. By specifically disclosing the use of a partially deactivated nickel catalyst and higher hydrogenation temperatures, White teaches away from the features of the claimed invention. Accordingly, the Section 103 rejection of claim 1 should be withdrawn.

Claims 2-20 and 25 depend from claim 1. Therefore, the Section 103 rejection of these dependent claims should be withdrawn for the reasons discussed above and for the additional features of these claims.

Independent claim 57 includes the limitations of being formed by the process of claim 1. Accordingly, for the reasons discussed above, the Section 103 rejection of claim 57 is unsupported by Boerma in view of Maskaevev and White and should be withdrawn. Likewise, claim 58 is allowable as depending from allowable base claim 57, and also because of the additional features of this dependent claim. Accordingly, the Section 103 rejection of claim 58 should be withdrawn.



D. Response to Claim Objection

Claims 21-24 and 26-27 are objected to as being dependent upon a rejected base claim. As claims 21-24 and 26-27 depend from allowable claim 1, the objections to these dependent claims should be withdrawn for the reasons discussed above and for the additional features of these claims.

E. Allowable Claims

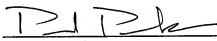
The applicants would like to thank the Examiner for allowing claims 28-48, 53-56 and 63-78. As such, these claims have not been amended in this response.

F. Conclusion

In view of the foregoing, the pending claims comply with 35 U.S.C. § 112 and are patentable over the applied reference. The applicants request reconsideration of the application and respectfully submit that all of the claims are in condition for allowance. If the Examiner has any questions or believes a telephone conference would expedite prosecution of this application, the Examiner is encouraged to call the undersigned representative at (206) 359-8000.

Respectfully submitted,  
Perkins Coie LLP

Date: May 14, 2007

  
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